

Fig. 1A (Prior Art)

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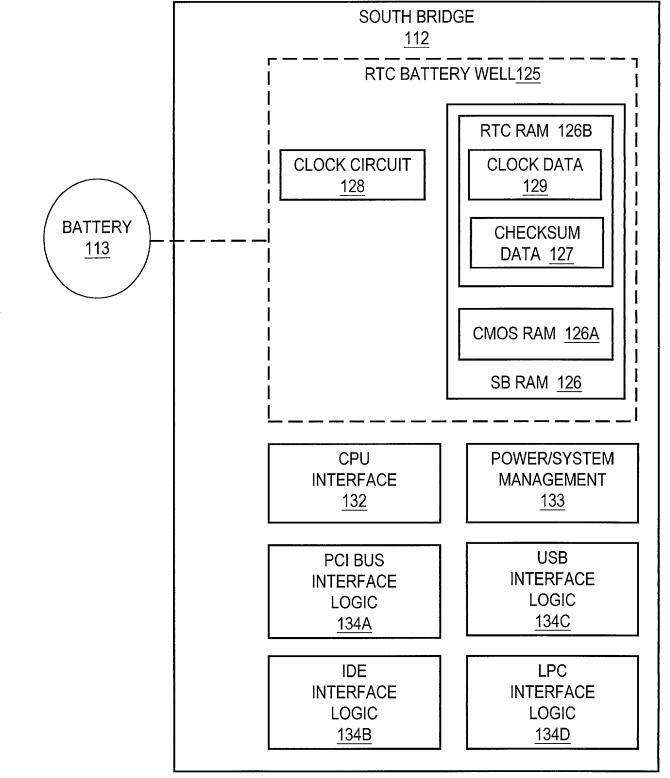


Fig. 1B (Prior Art)

THE WAR

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Fig. 2A (Prior Art)

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Fig. 2B (Prior Art)

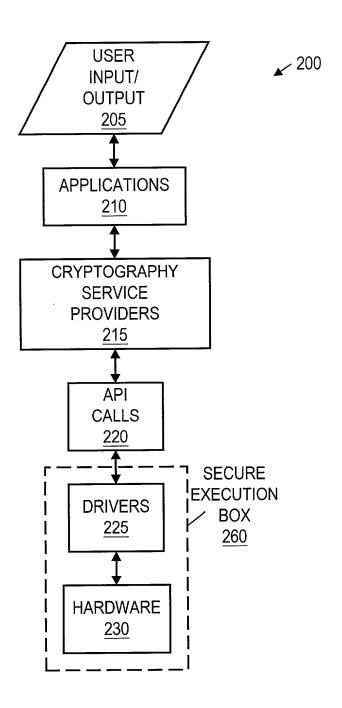
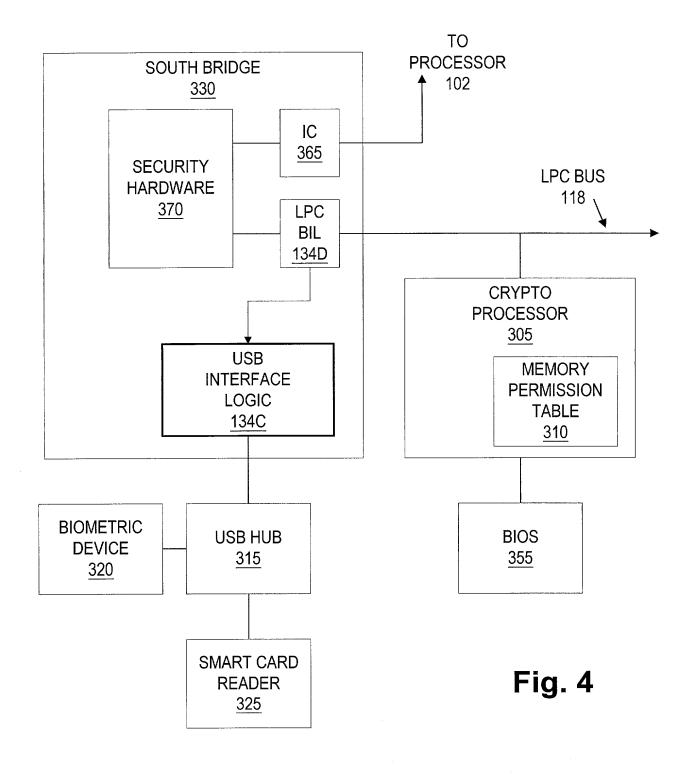


Fig. 3

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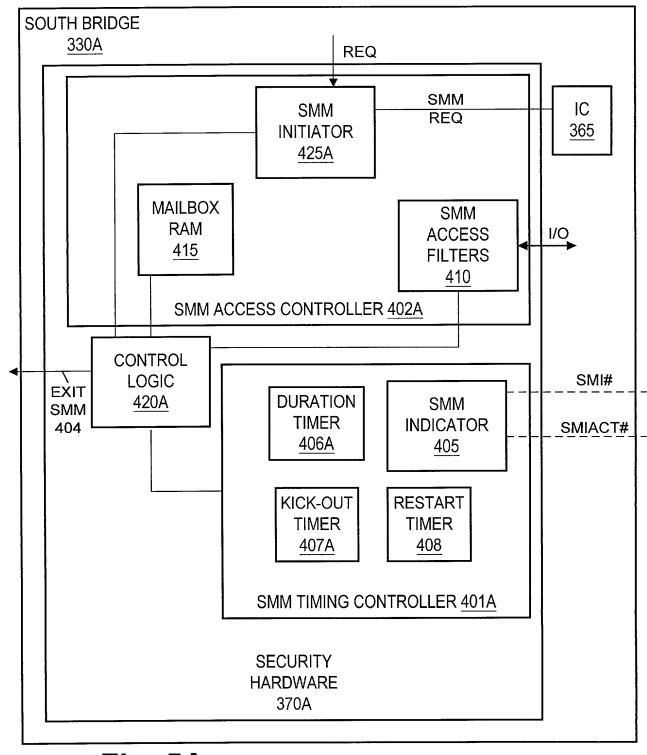


Fig. 5A



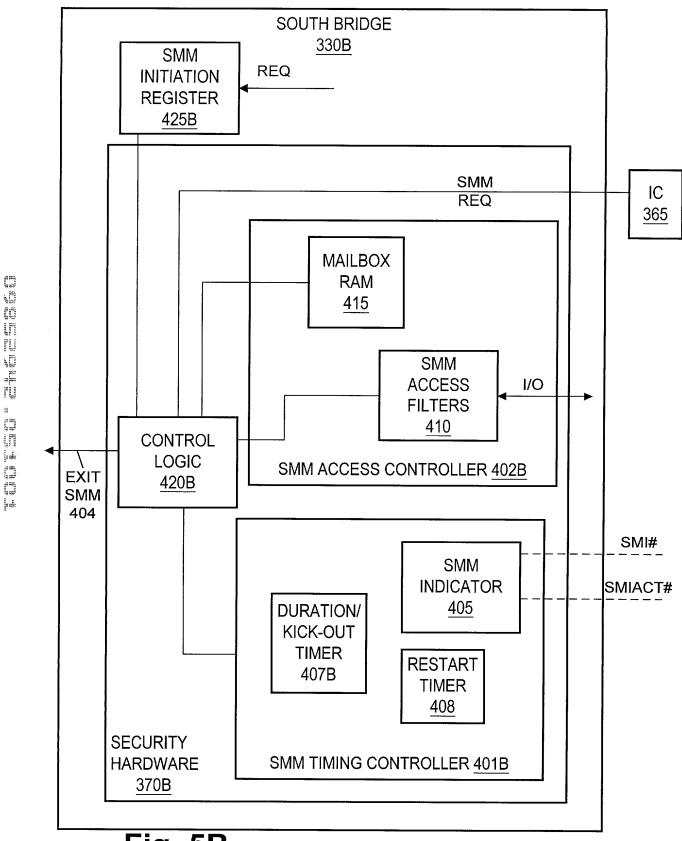


Fig. 5B

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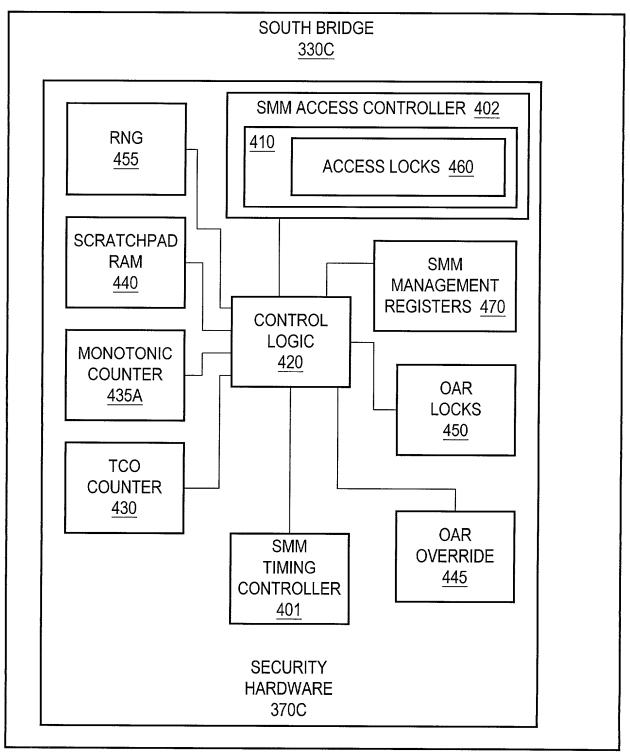
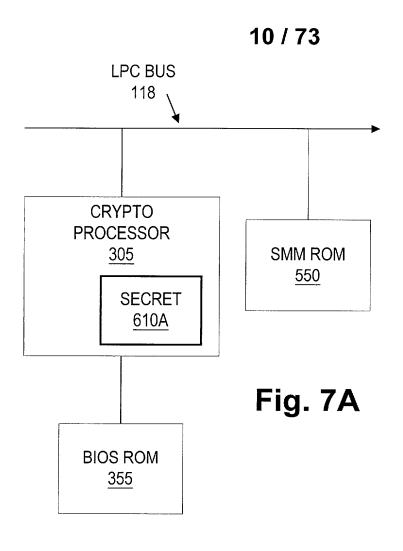


Fig. 6



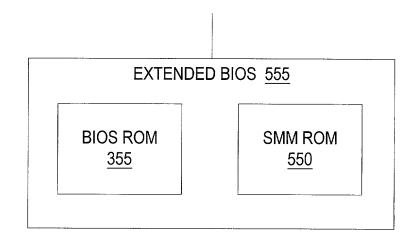


Fig. 7B

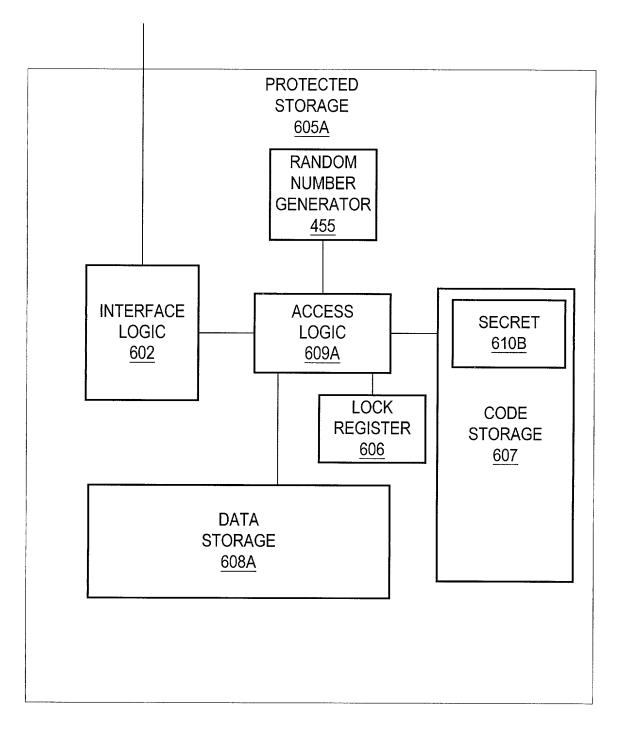


Fig. 7C

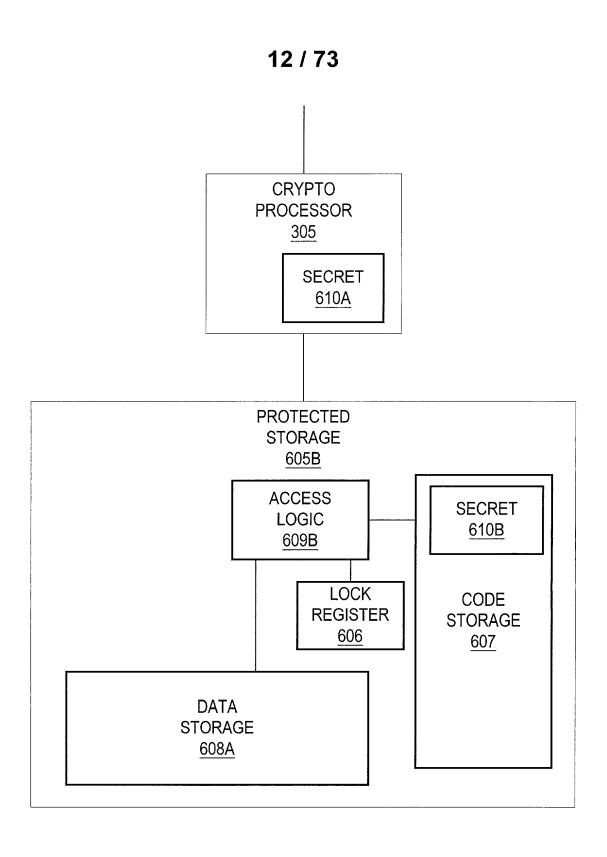


Fig. 7D

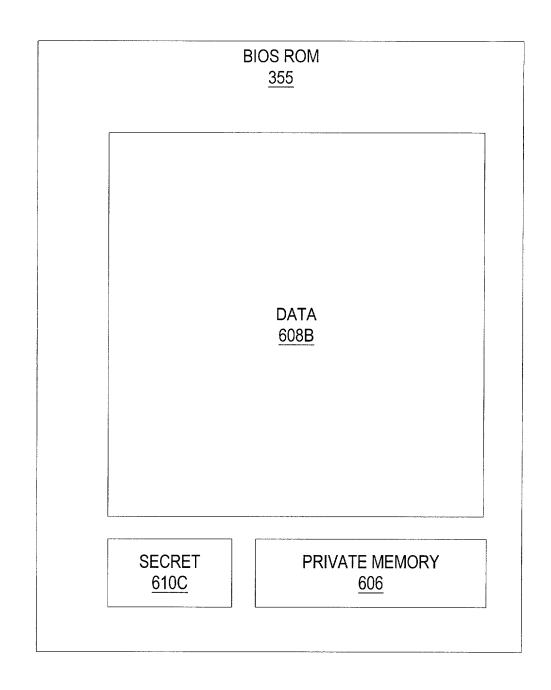


Fig. 8A

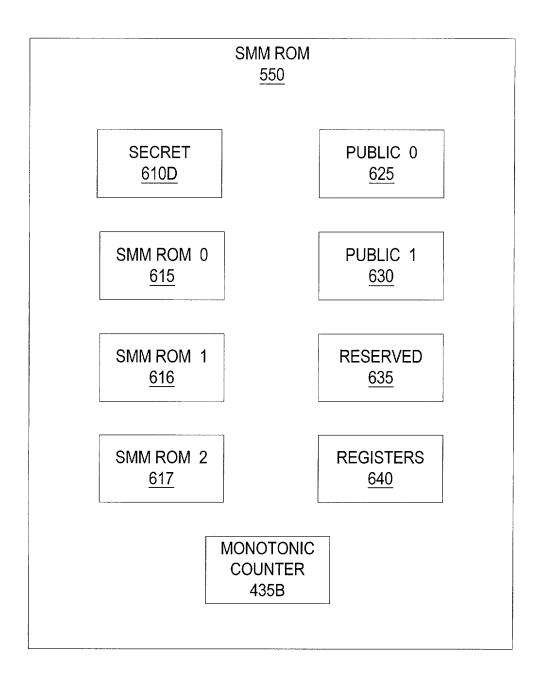


Fig. 8B

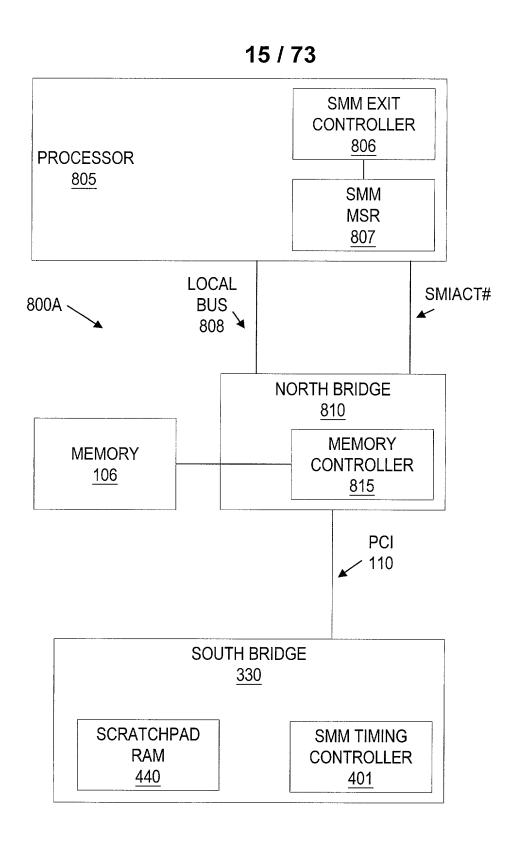


Fig. 9A

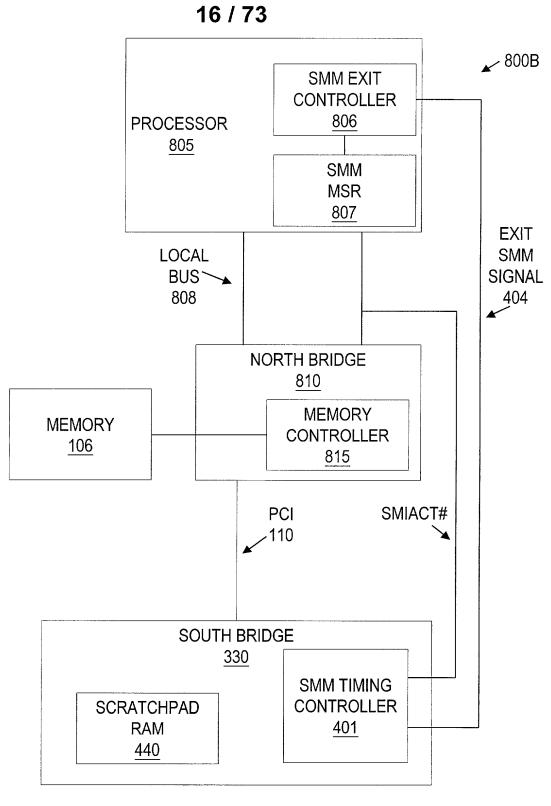


Fig. 9B

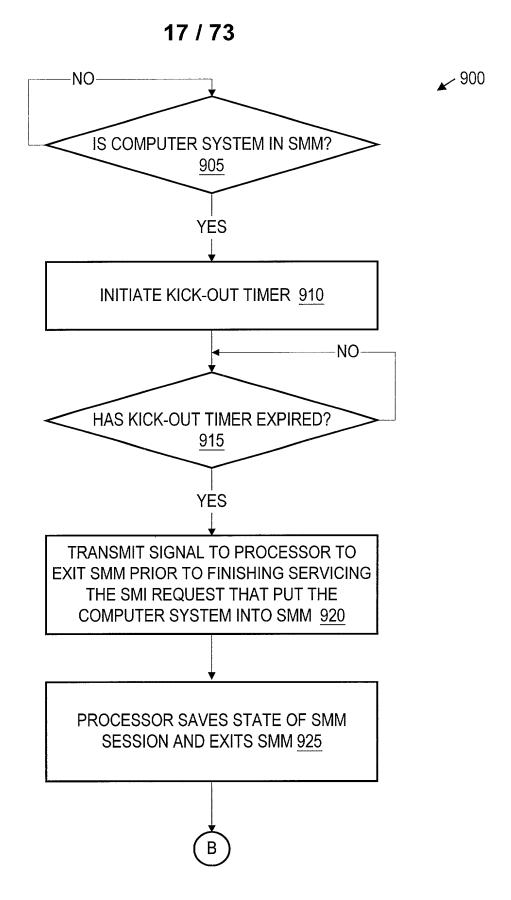


Fig. 10A

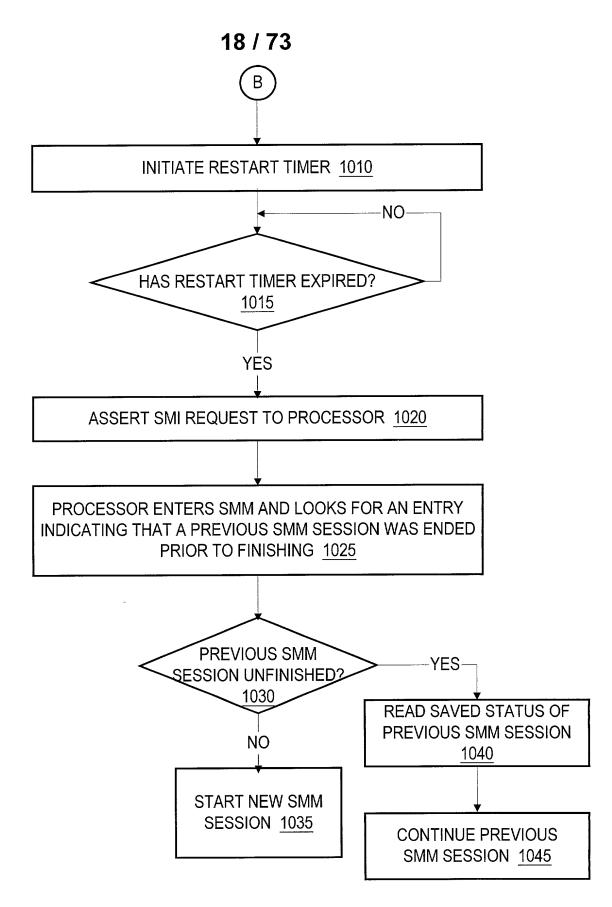


Fig. 10B

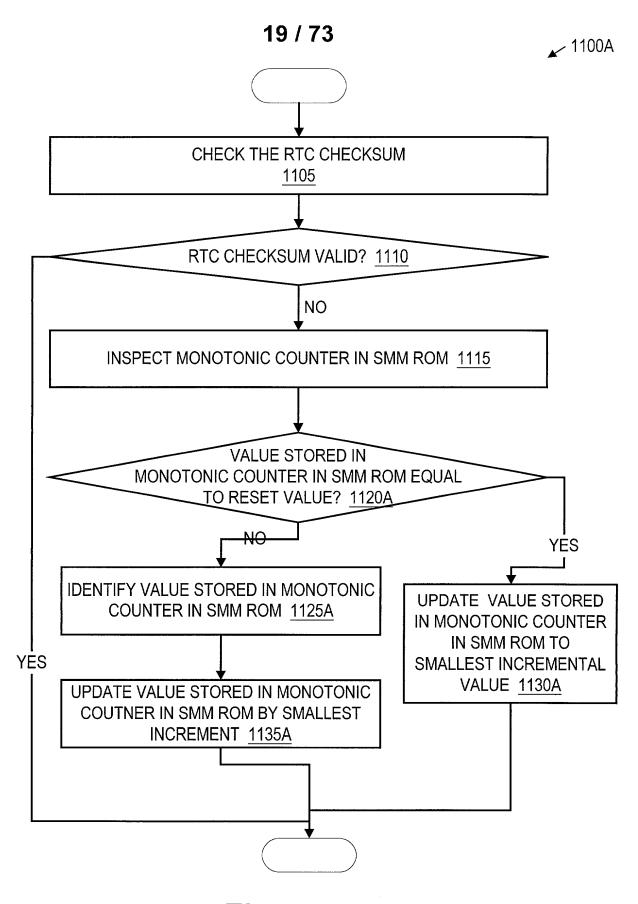


Fig. 11A

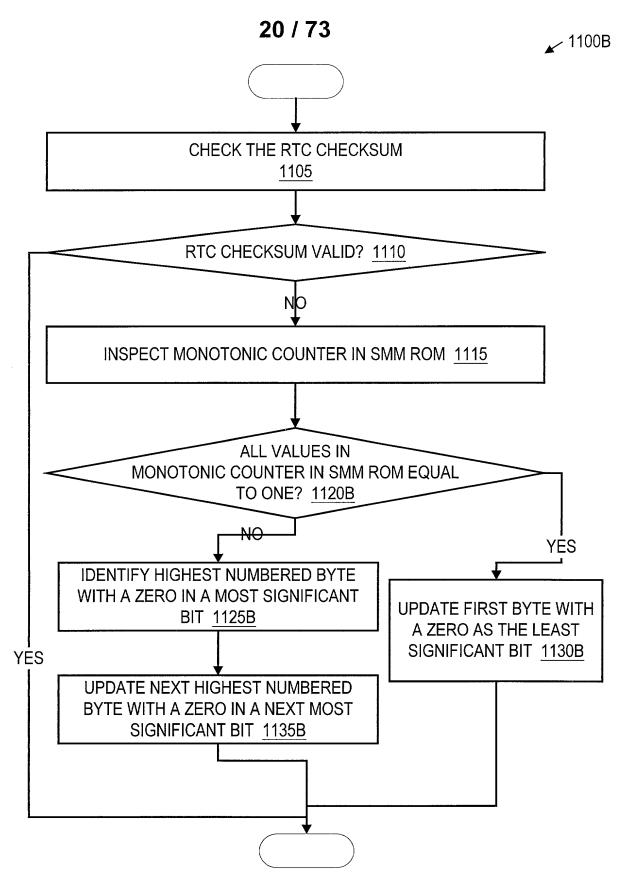


Fig. 11B

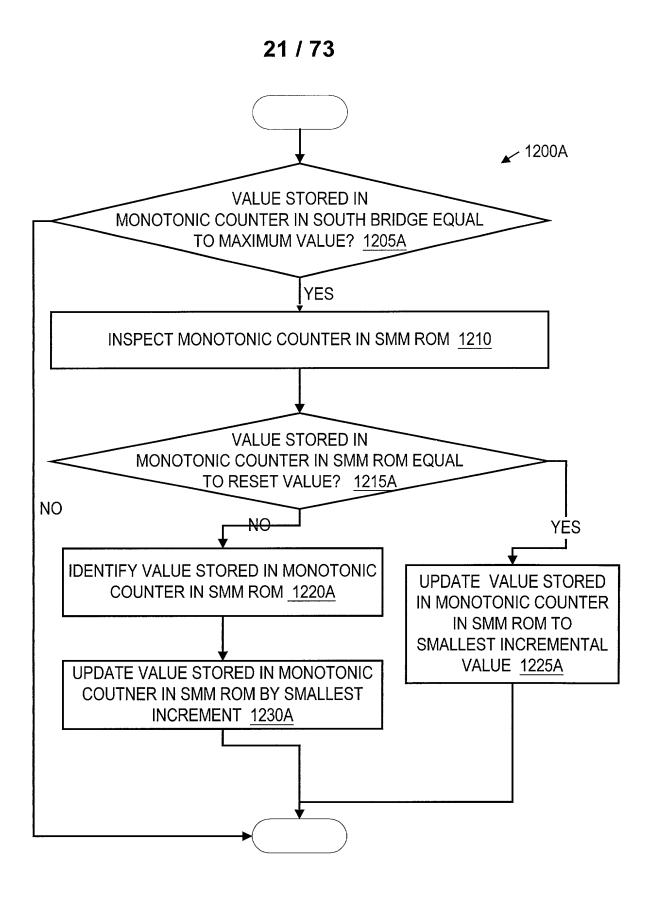


Fig. 12A

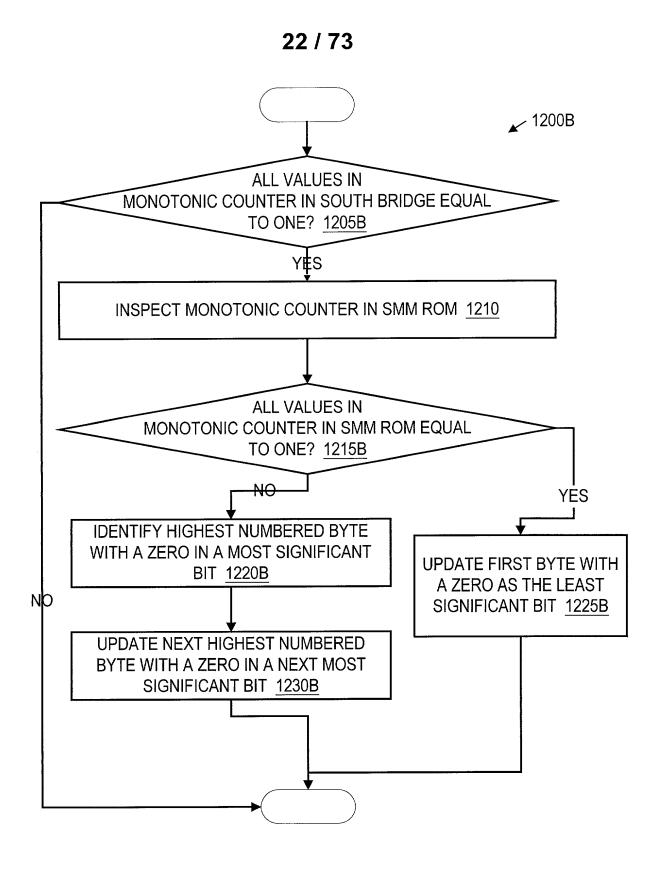


Fig. 12B

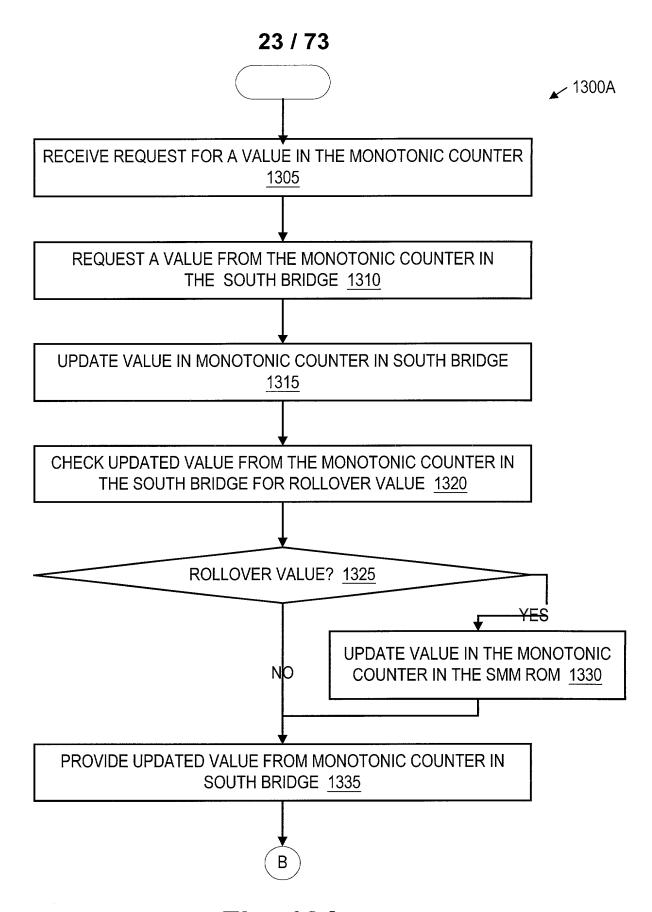


Fig. 13A

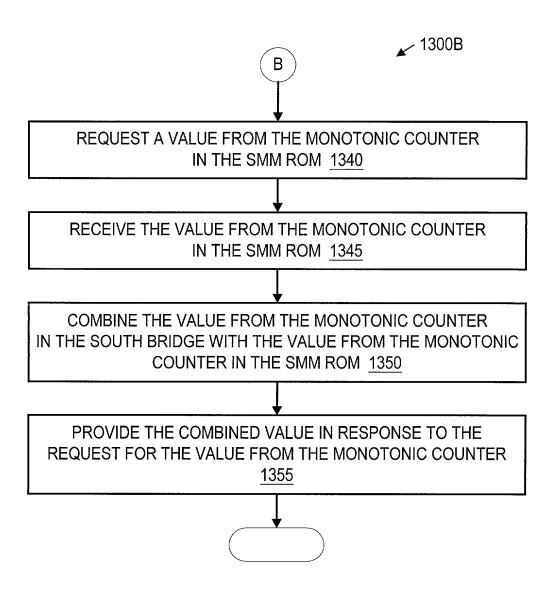


Fig. 13B

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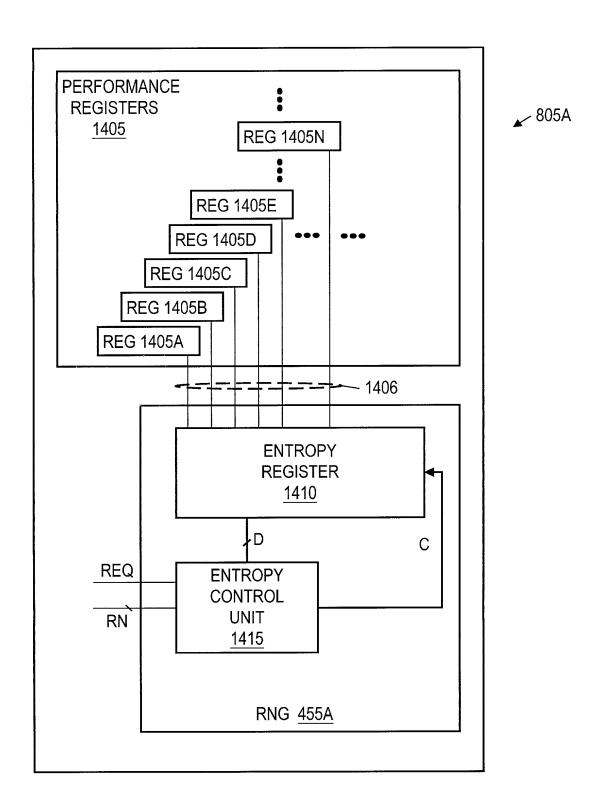


Fig. 14A

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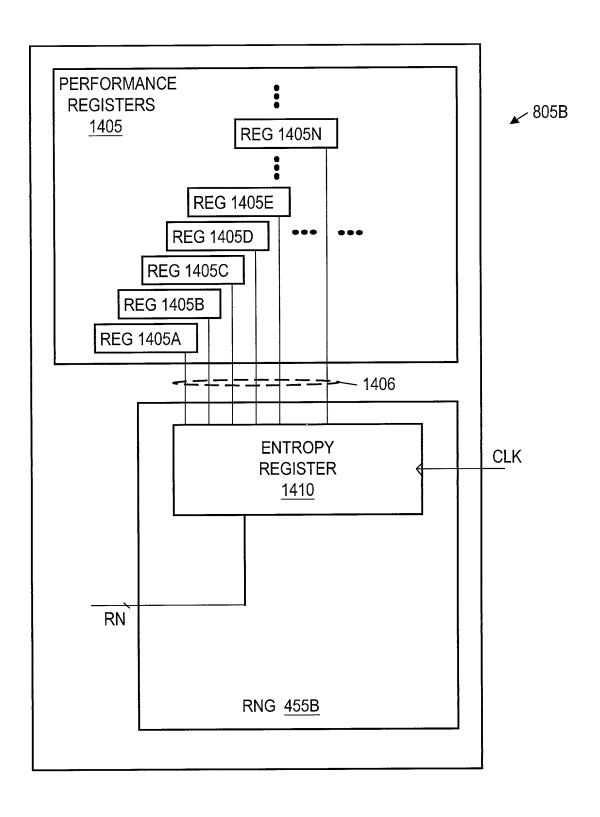


Fig. 14B

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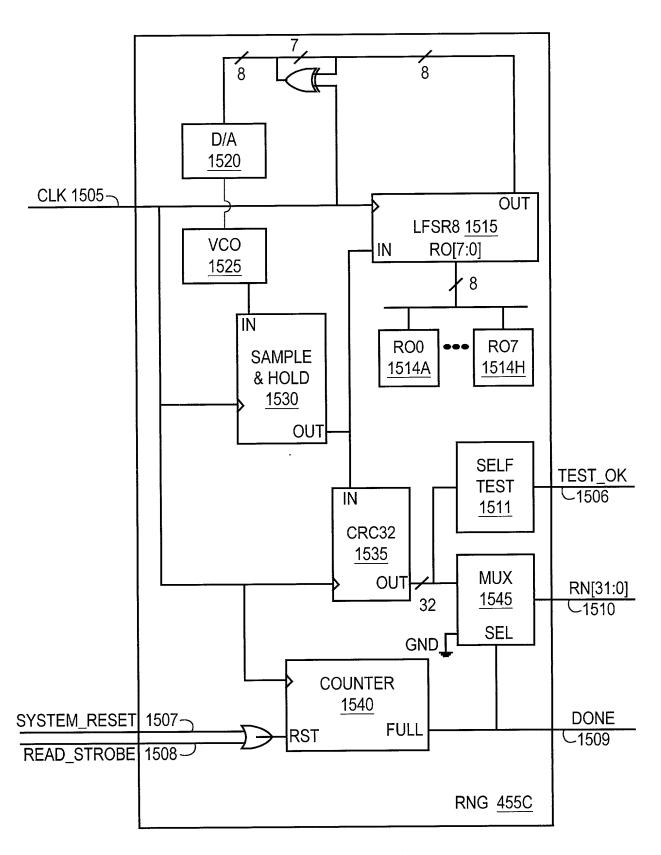


Fig. 15



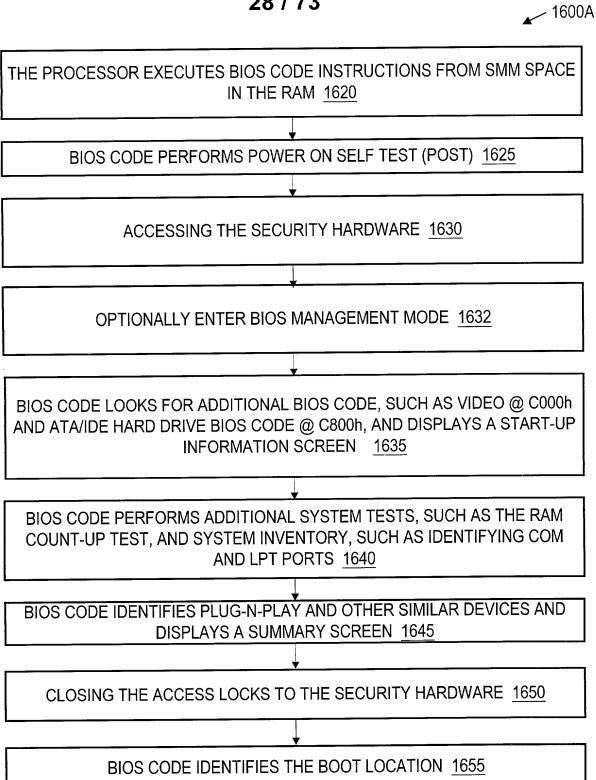


Fig. 16A

BIOS CODE CALLS THE BOOT SECTOR CODE TO BOOT THE COMPUTER SYSTEM 1660

___ 1600B

OPENING THE ACCESS LOCKS TO THE SECURITY HARDWARE 1615 THE PROCESSOR EXECUTES BIOS CODE INSTRUCTIONS FROM SMM SPACE IN THE RAM 1620 ACCESSING THE SECURITY HARDWARE 1630 OPTIONALLY ENTER BIOS MANAGEMENT MODE 1632 BIOS CODE LOOKS FOR ADDITIONAL BIOS CODE, SUCH AS VIDEO @ C000h AND ATA/IDE HARD DRIVE BIOS CODE @ C800h, AND DISPLAYS A START-UP INFORMATION SCREEN 1635 BIOS CODE IDENTIFIES PLUG-N-PLAY AND OTHER SIMILAR DEVICES AND DISPLAYS A SUMMARY SCREEN 1645 CLOSING THE ACCESS LOCKS TO THE SECURITY HARDWARE 1650 BIOS CODE IDENTIFIES THE BOOT LOCATION 1655 BIOS CODE CALLS THE BOOT SECTOR CODE TO BOOT THE COMPUTER SYSTEM 1660

Fig. 16B

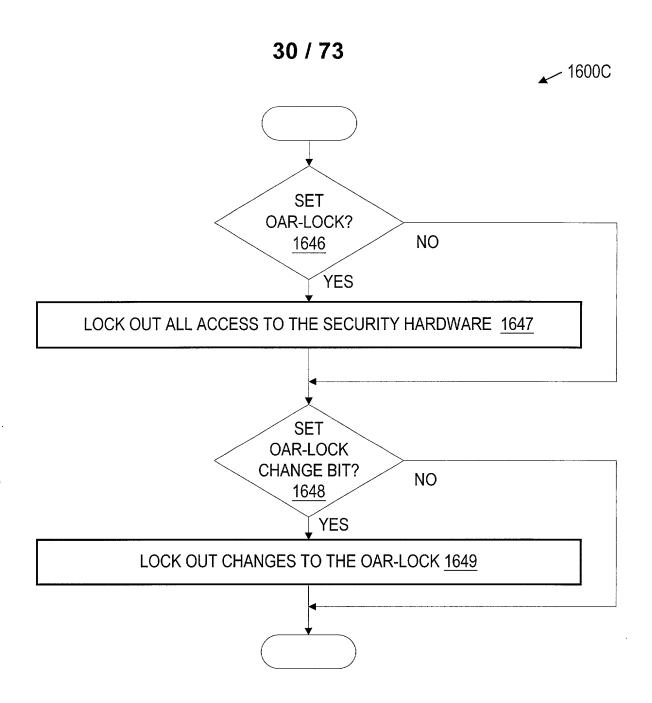


Fig. 16C

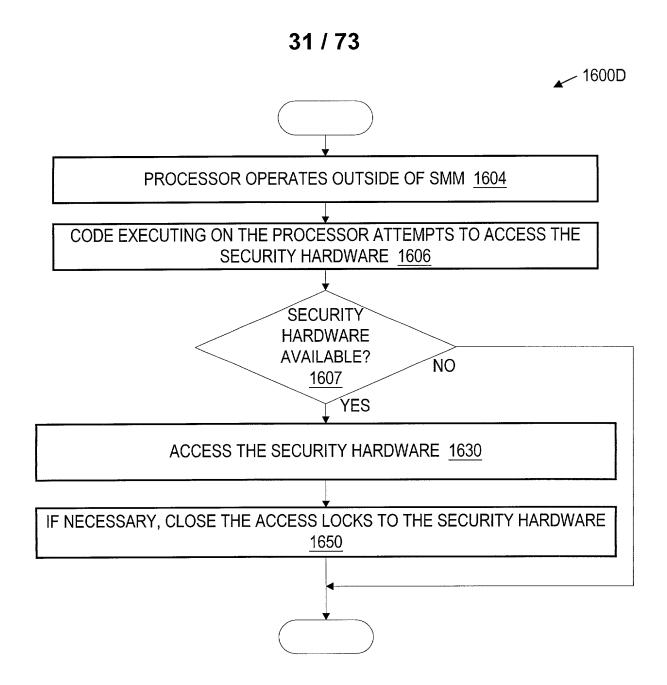


Fig. 16D

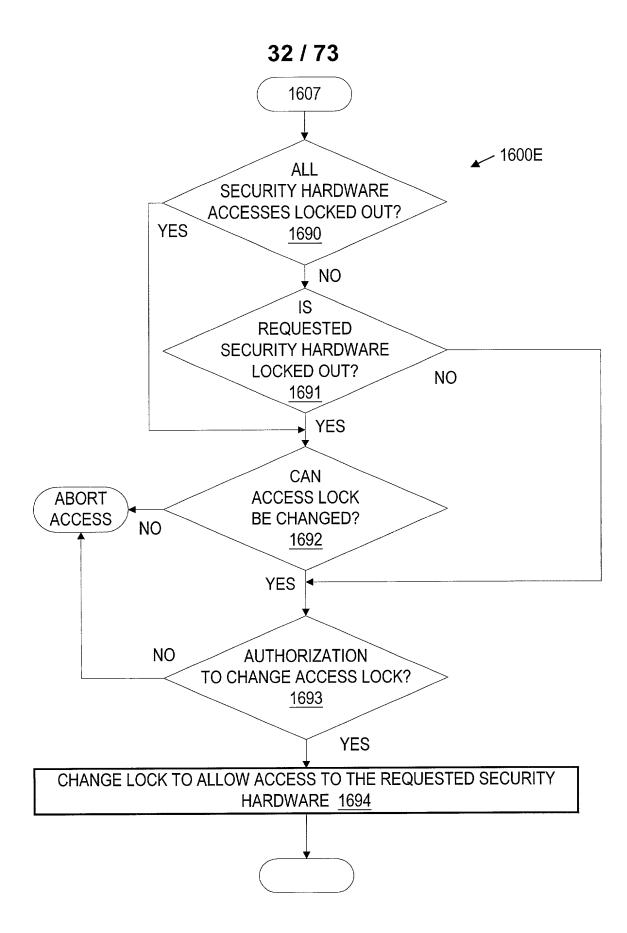


Fig. 16E

THE PROCESSOR LOADS CODE INSTRUCTIONS INTO SMM SPACE IN THE RAM 1605

OPENING THE ACCESS LOCKS TO THE SECURITY HARDWARE 1615

THE PROCESSOR EXECUTES SMM CODE INSTRUCTIONS FROM SMM SPACE IN THE RAM 1620

ACCESSING THE SECURITY HARDWARE 1630

CLOSING THE ACCESS LOCKS TO THE SECURITY HARDWARE 1650

THE PROCESSOR RELOADS THE PREVIOUS STATE AND CONTINUES OPERATING 1665

Fig. 16F

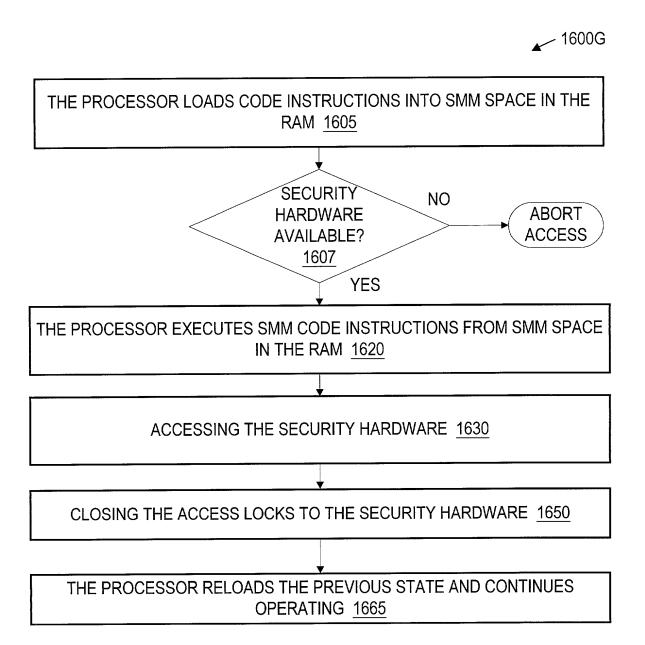
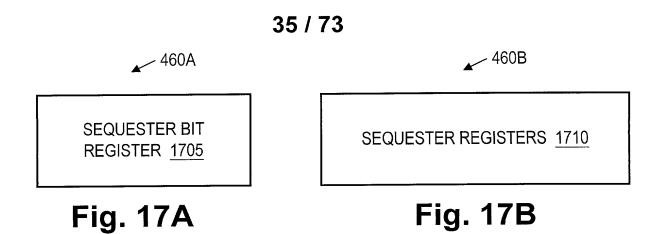
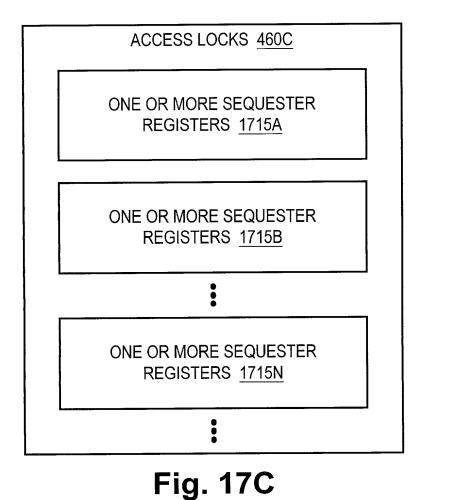


Fig. 16G





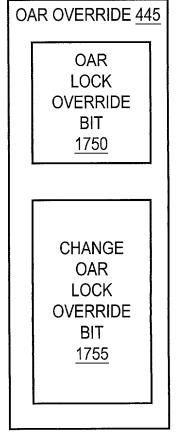
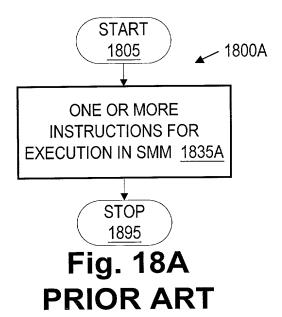


Fig. 17D



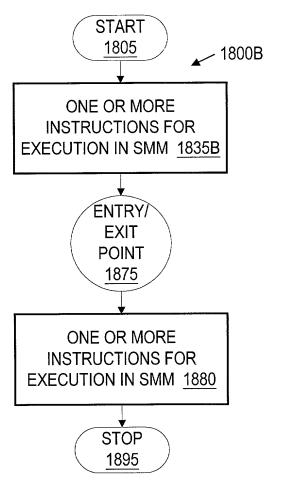


Fig. 18B

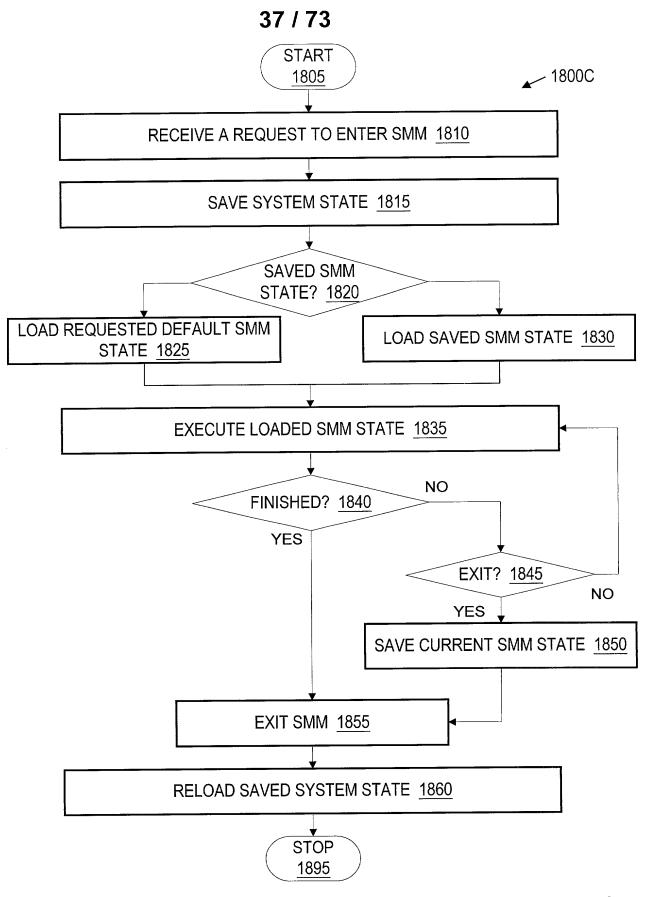


Fig. 18C

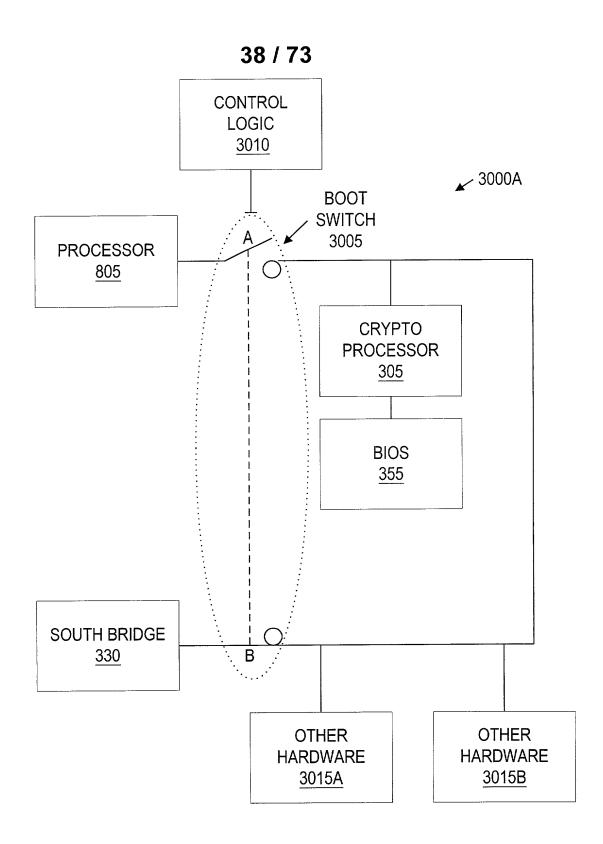
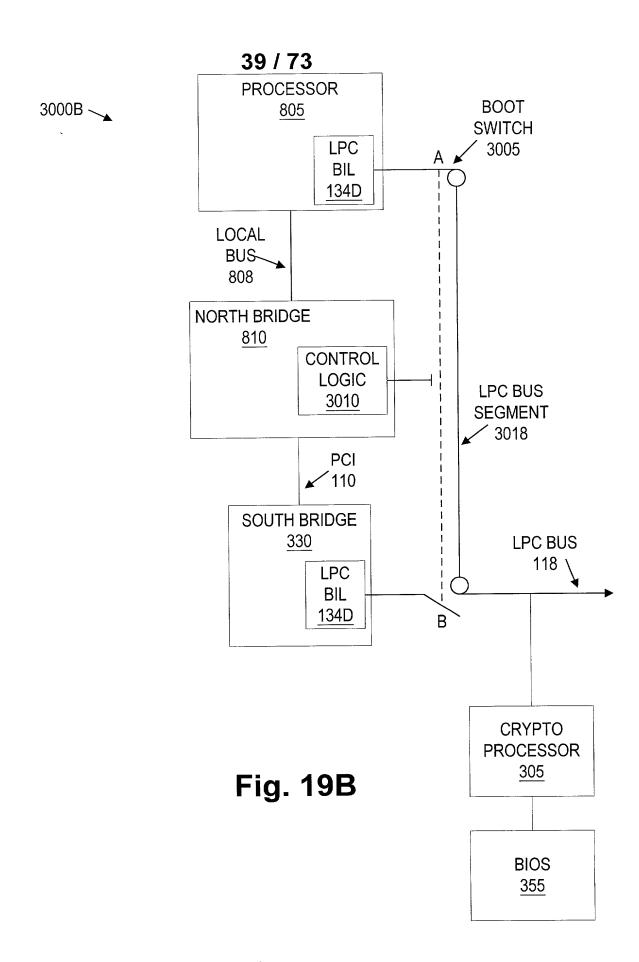


Fig. 19A



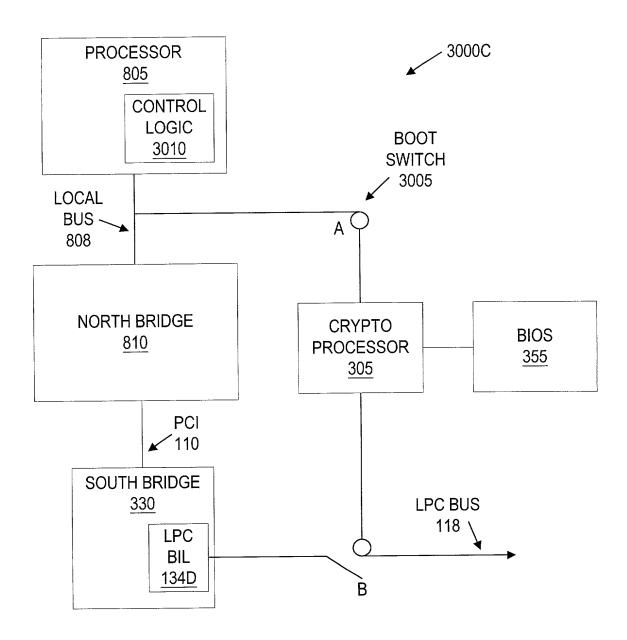


Fig. 19C

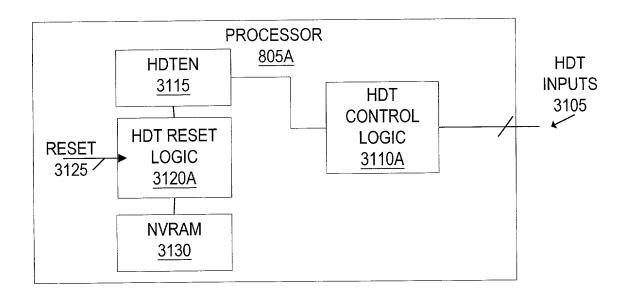
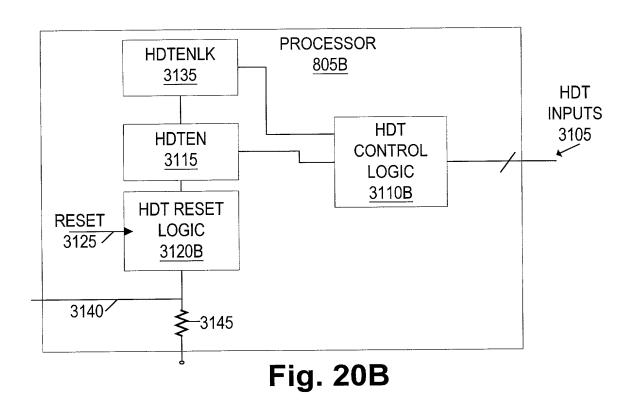
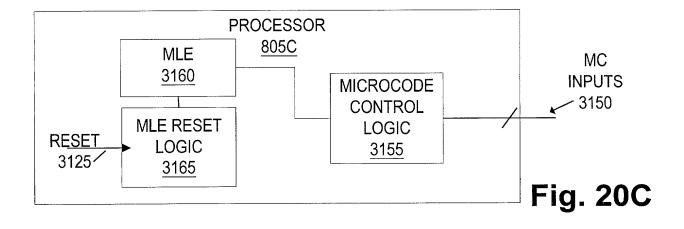
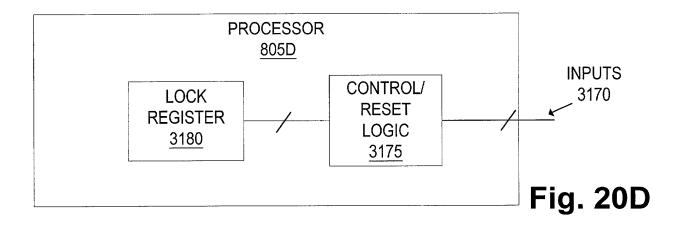


Fig. 20A







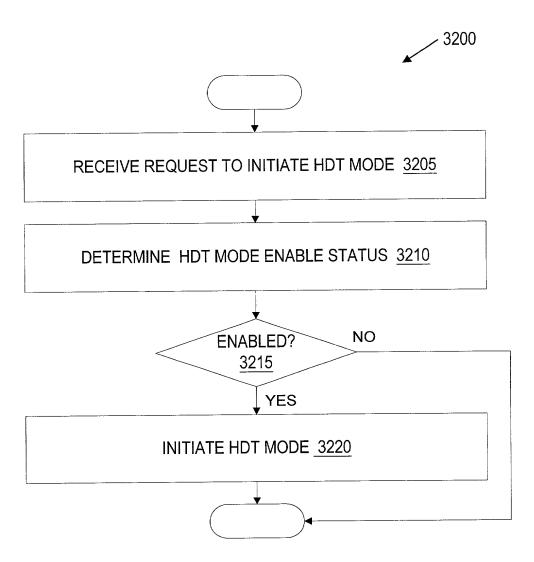


Fig. 21

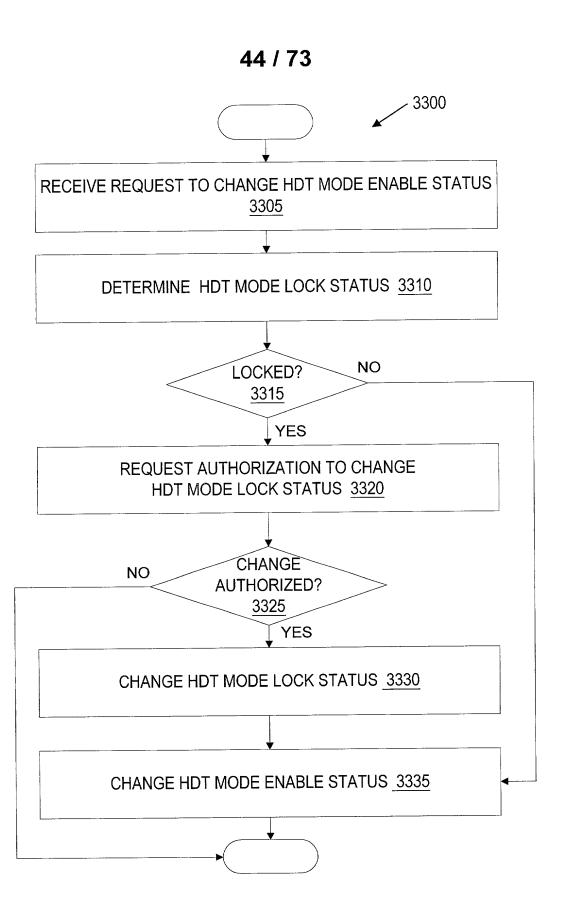


Fig. 22

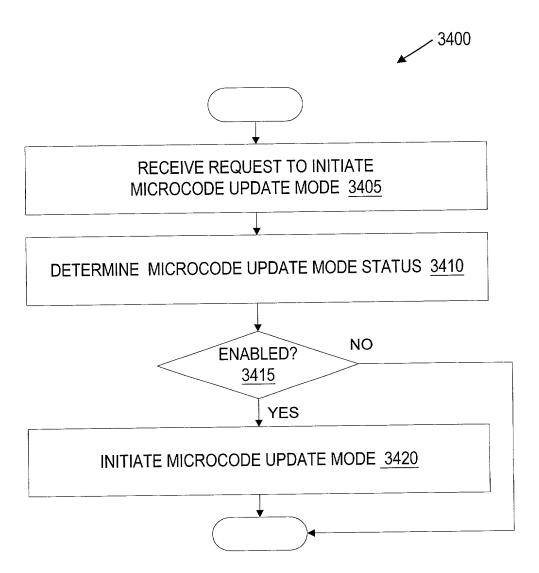


Fig. 23

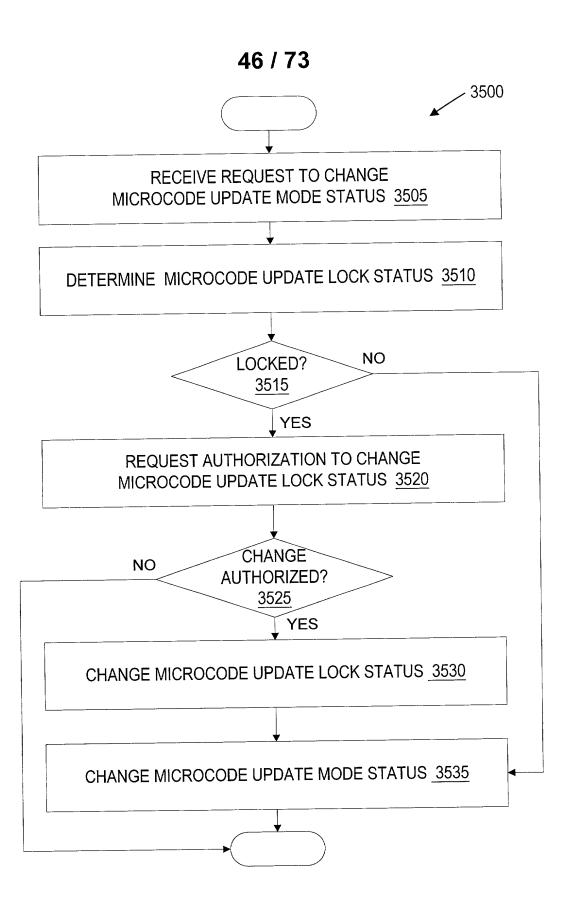


Fig. 24

- 3600A A SECURITY DEVICE RECEIVES A TRANSACTION REQUEST FOR A STORAGE LOCATION ASSOCIATED WITH A STORAGE DEVICE CONNECTED TO THE SECURITY DEVICE 3605A THE SECURITY DEVICE PROVIDES ACCESS CONTROL FOR THE STORAGE DEVICE 3610A THE SECURITY DEVICE MAPS THE STORAGE LOCATION IN THE TRANSACTION REQUEST ACCORDING TO THE ADDRESS MAPPING OF THE STORAGE DEVICE 3615A THE SECURITY DEVICE PROVIDES THE TRANSACTION REQUEST TO THE STORAGE DEVICE 3620A THE STORAGE DEVICE PERFORMS THE REQUESTED TRANSACTION 3625A

Fig. 25A

∠ 3600B A CRYPTO-PROCESSOR RECEIVES A TRANSACTION REQUEST FOR A MEMORY LOCATION ASSOCIATED WITH A MEMORY CONNECTED TO THE CRYPTO-PROCESSOR 3605B THE CRYPTO-PROCESSOR PROVIDES ACCESS CONTROL FOR THE MEMORY 3610B THE CRYPTO-PROCESSOR MAPS THE MEMORY LOCATION IN THE TRANSACTION REQUEST ACCORDING TO THE ADDRESS MAPPING OF THE MEMORY 3615B THE CRYPTO-PROCESSOR PROVIDES THE TRANSACTION REQUEST TO THE MEMORY 3620B THE MEMORY PERFORMS THE REQUESTED TRANSACTION 3625B

Fig. 25B

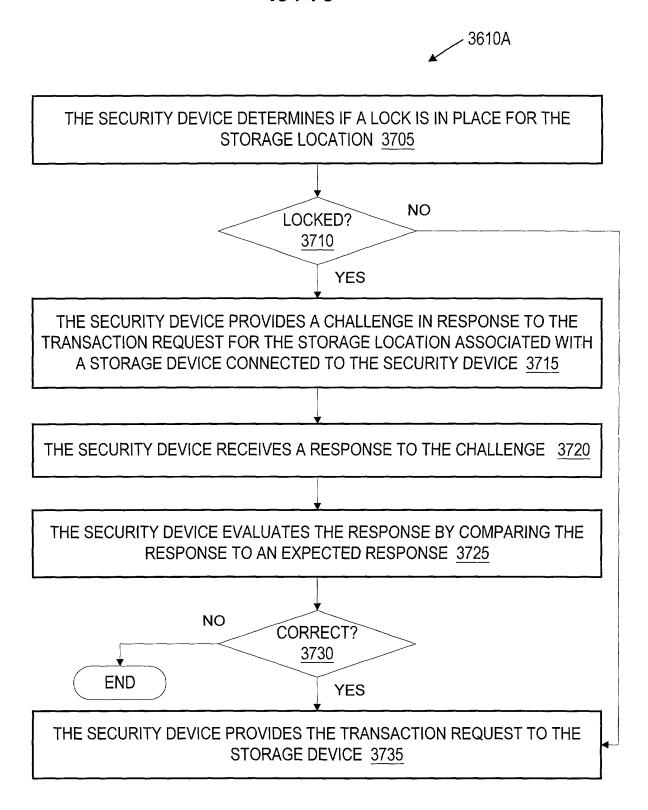


Fig. 26

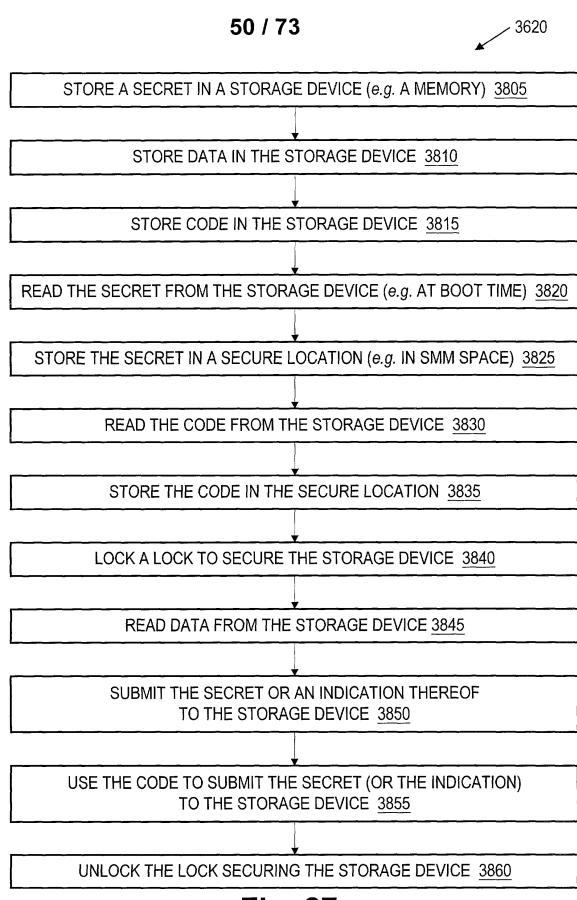


Fig. 27

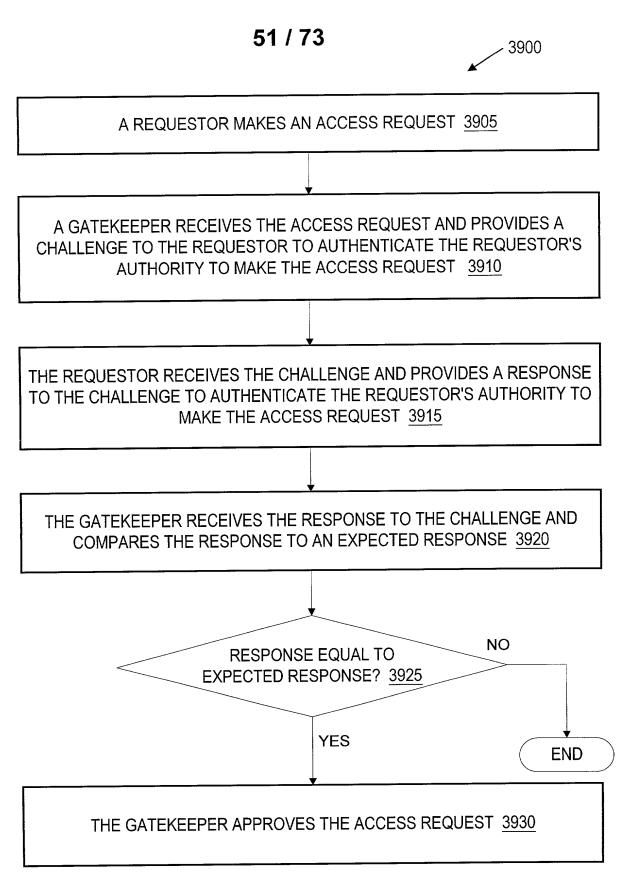
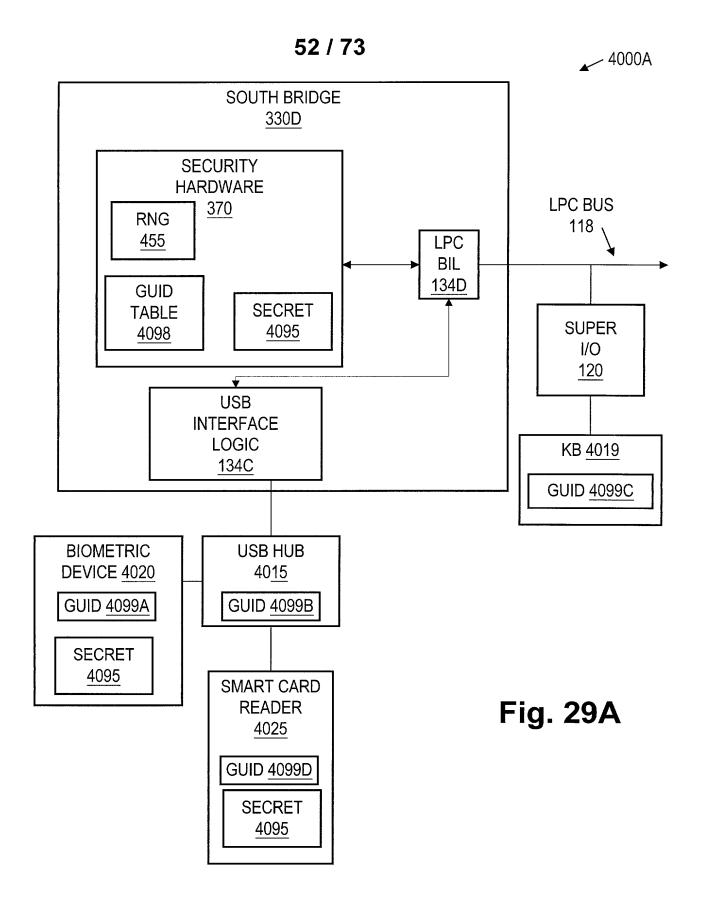


Fig. 28 (Prior Art)



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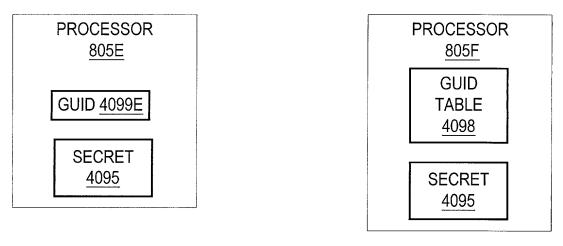
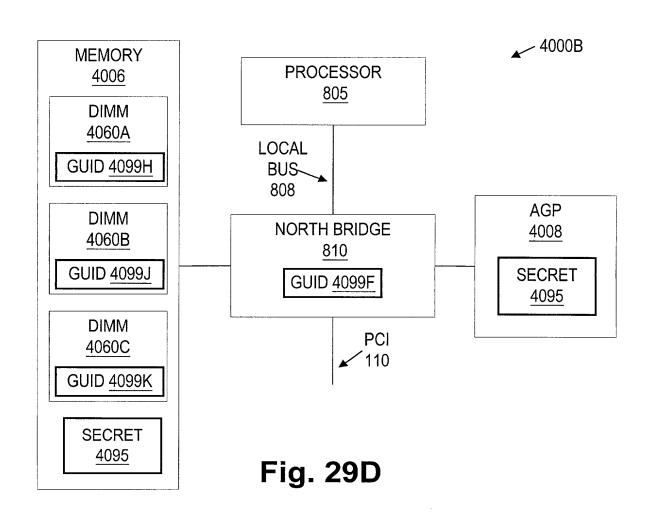
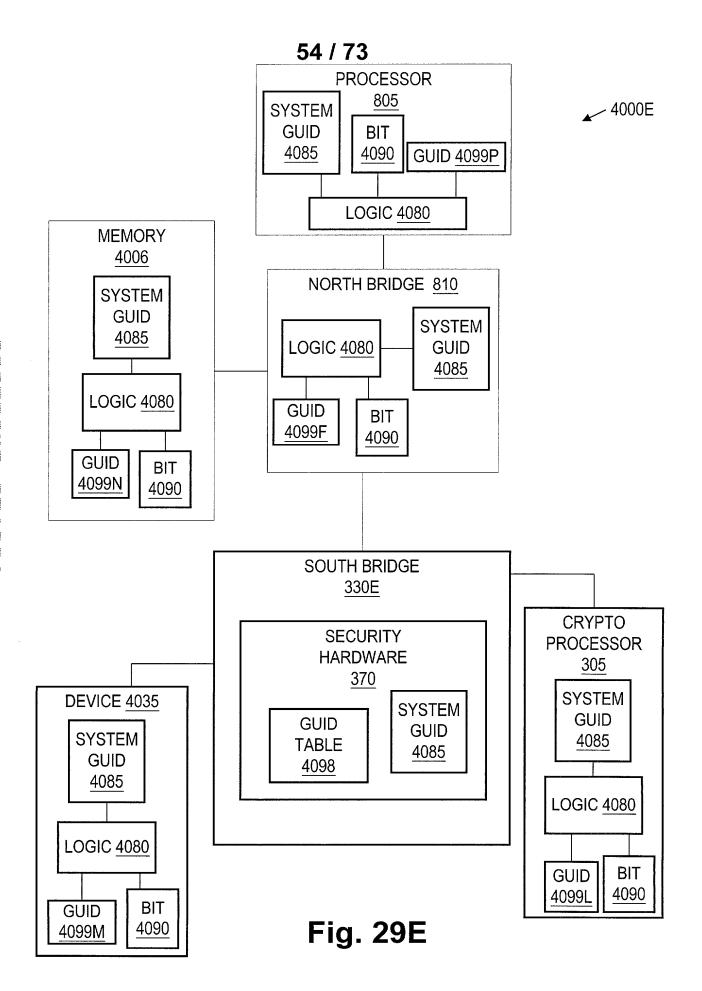


Fig. 29B

Fig. 29C





4100A

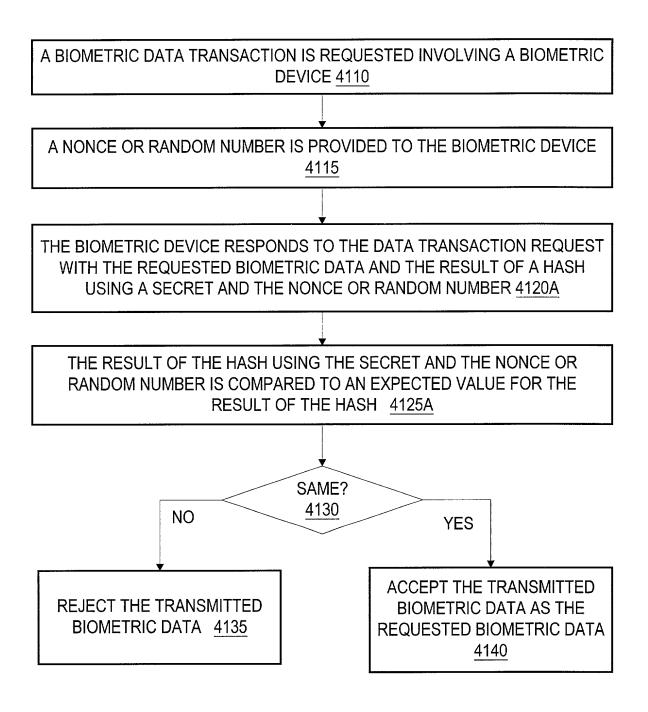


Fig. 30A

4100B

A BIOMETRIC DATA TRANSACTION IS REQUESTED INVOLVING A BIOMETRIC **DEVICE 4110** A NONCE OR RANDOM NUMBER IS PROVIDED TO THE BIOMETRIC DEVICE 4115 THE BIOMETRIC DEVICE RESPONDS TO THE DATA TRANSACTION REQUEST WITH THE REQUESTED BIOMETRIC DATA IN ENCRYPTED FORM AND THE RESULT OF A HASH USING A SECRET AND THE NONCE OR RANDOM NUMBER 4120B THE RESULT OF THE HASH USING THE SECRET AND THE NONCE OR RANDOM NUMBER IS COMPARED TO AN EXPECTED VALUE FOR THE RESULT OF THE HASH 4125B SAME? 4130 NO YES ACCEPT THE TRANSMITTED REJECT THE TRANSMITTED BIOMETRIC DATA AS THE BIOMETRIC DATA 4135 REQUESTED BIOMETRIC DATA 4140

Fig. 30B

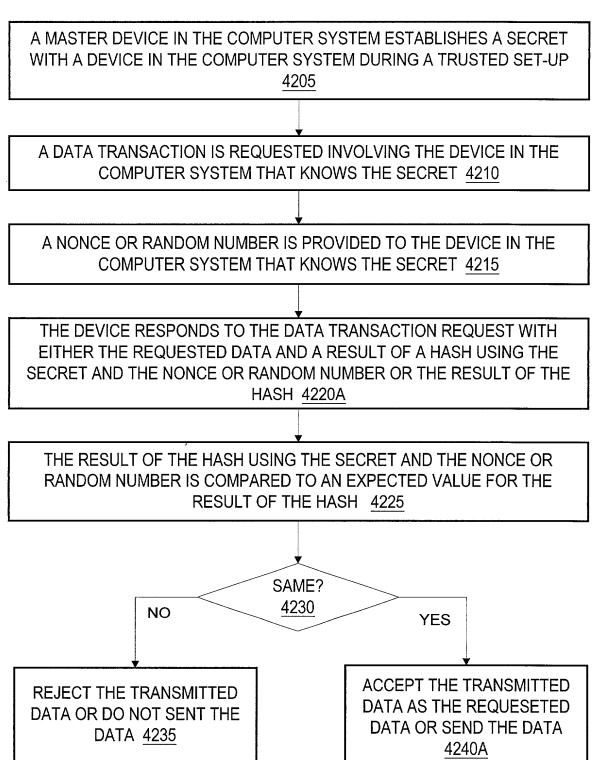


Fig. 31A

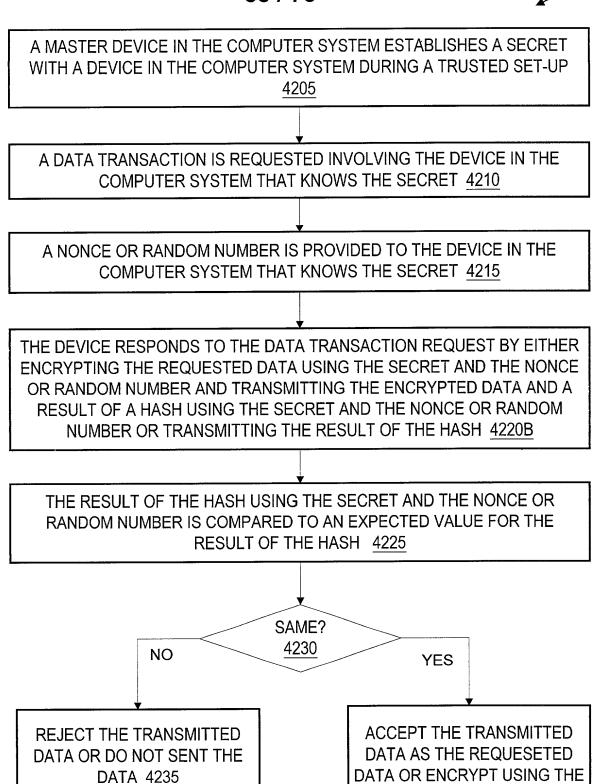


Fig. 31B

SECRET AND THE NONCE OR RANDOM NUMBER AND SEND THE ENCRYPTED DATA 4240B



A MASTER DEVICE IN THE COMPUTER SYSTEM READS THE GUID FOR A DEVICE IN THE COMPUTER SYSTEM AND RECORDS THE GUID IN A GUID TABLE DURING A TRUSTED SET-UP 4305

A DATA TRANSACTION IS REQUESTED INVOLVING THE DEVICE IN THE COMPUTER SYSTEM WITH THE KNOWN GUID 4310

A NONCE OR RANDOM NUMBER IS PROVIDED TO THE DEVICE IN THE COMPUTER SYSTEM WITH THE KNOWN GUID 4315

THE DEVICE RESPONDS TO THE DATA TRANSACTION REQUEST WITH THE REQUESTED DATA AND A RESULT OF A HASH USING THE GUID AND THE NONCE OR RANDOM NUMBER OR THE RESULT OF THE HASH 4320A

THE RESULT OF THE HASH USING THE GUID AND THE NONCE OR RANDOM NUMBER IS COMPARED TO AN EXPECTED VALUE FOR THE RESULT OF THE HASH 4325

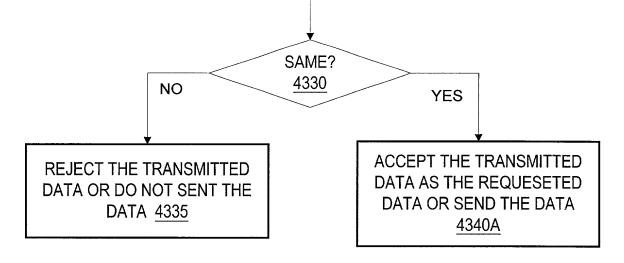


Fig. 32A



√ 4300B

A MASTER DEVICE IN THE COMPUTER SYSTEM READS THE GUID FOR A DEVICE IN THE COMPUTER SYSTEM AND RECORDS THE GUID IN A GUID TABLE DURING A TRUSTED SET-UP 4305

A DATA TRANSACTION IS REQUESTED INVOLVING THE DEVICE IN THE COMPUTER SYSTEM WITH THE KNOWN GUID 4310

A NONCE OR RANDOM NUMBER IS PROVIDED TO THE DEVICE IN THE COMPUTER SYSTEM WITH THE KNOWN GUID 4315

THE DEVICE RESPONDS TO THE DATA TRANSACTION REQUEST BY ENCRYPTING THE REQUESTED DATA USING THE GUID AND THE NONCE OR RANDOM NUMBER AND TRANSMITTING THE ENCRYPTED DATA AND A RESULT OF A HASH USING THE GUID AND THE NONCE OR RANDOM NUMBER OR TRANSMITTING THE RESULT OF THE HASH 4320B

THE RESULT OF THE HASH USING THE GUID AND THE NONCE OR RANDOM NUMBER IS COMPARED TO AN EXPECTED VALUE FOR THE RESULT OF THE HASH 4325

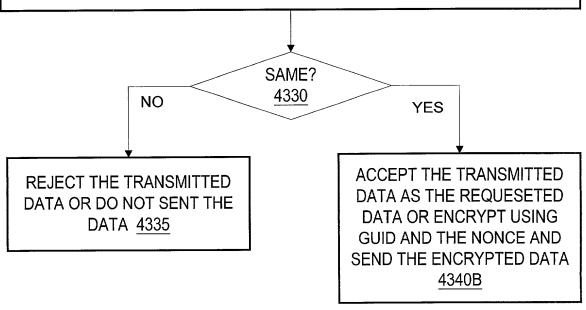


Fig. 32B

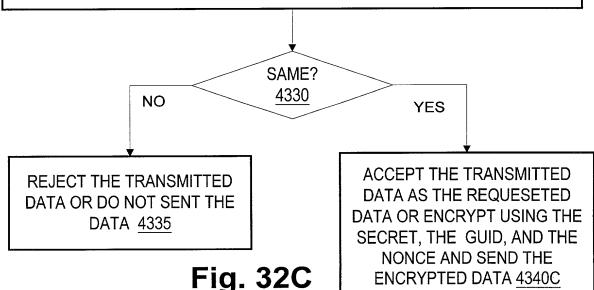
A MASTER DEVICE IN THE COMPUTER SYSTEM READS THE GUID FOR A DEVICE IN THE COMPUTER SYSTEM, RECORDS THE GUID IN A GUID TABLE, AND TRANSMITS A SECRET TO THE DEVICE DURING A TRUSTED SET-UP 4306

A DATA TRANSACTION IS REQUESTED INVOLVING THE DEVICE IN THE COMPUTER SYSTEM WITH THE KNOWN GUID THAT KNOWS THE SECRET 4311

A NONCE OR RANDOM NUMBER IS PROVIDED TO THE DEVICE IN THE COMPUTER SYSTEM WITH THE KNOWN GUID THAT KNOWS THE SECRET 4316

THE DEVICE RESPONDS TO THE DATA TRANSACTION REQUEST BY ENCRYPTING THE REQUESTED DATA USING THE SECRET, THE GUID, AND THE NONCE OR RANDOM NUMBER AND TRANSMITTING THE ENCRYPTED DATA AND A RESULT OF A HASH USING THE SECRET, THE GUID, AND THE NONCE OR RANDOM NUMBER OR TRANSMITTING THE RESULT OF THE HASH 4320C

THE RESULT OF THE HASH USING THE SECRET, THE GUID, AND THE NONCE OR RANDOM NUMBER IS COMPARED TO AN EXPECTED VALUE FOR THE RESULT OF THE HASH 4326



4400 A MASTER DEVICE IN THE COMPUTER SYSTEM READS THE GUID FOR A DEVICE IN THE COMPUTER SYSTEM AND RECORDS THE GUID IN A GUID TABLE DURING A TRUSTED SET-UP 4405 THE DEVICE MAY RECEIVE A SYSTEM GUID FROM THE MASTER DEVICE AND STORE THE SYSTEM GUID 4410 THE DEVICE SETS A INTRODUCED BIT IN RESPONSE TO JOINING THE **COMPUTER SYSTEM 4415** THE DEVICE RECEIVES A TRANSACTION REQUEST FROM THE COMPUTER SYSTEM AND THE DEVICE CHECKS IF ITS INTRODUCED BIT IS SET 4420 SET? 4425 NO YES THE DEVICE DOES NOT THE DEVICE MAY REQUEST **FULFILL THE TRANSACTION AUTHENTICATION FROM THE** REQUEST OR DO NOT COMPUTER SYSTEM USING A SECRET RESPOND TO THE (e.g. THE GUID AND/OR THE SYSTEM TRANSACTION REQUEST 4430 GUID) BEFORE RESPONDING TO THE TRANSACTION REQUEST 4435 NO **AUTHENTICATE** OK? 4440

THE DEVICE FULFILLS THE TRANSACTION REQUEST 4445 Fig. 33

YES



4500

THE DEVICE OR THE MASTER DEVICE INITIATES A REQUEST FOR THE DEVICE TO LEAVE THE COMPUTER SYSTEM 4505

THE DEVICE AND THE MASTER DEVICE AUTHENTICATE EACH OTHER USING THE GUID AND/OR THE SYSTEM GUID IN RESPONSE TO THE REQUEST FOR THE DEVICE TO LEAVE THE COMPUTER SYSTEM 4510

THE DEVICE RESETS THE INTRODUCED BIT IN RESPONSE TO THE DEVICE AND THE MASTER DEVICE SUCCESSFULLY AUTHENTICATING EACH OTHER 4515

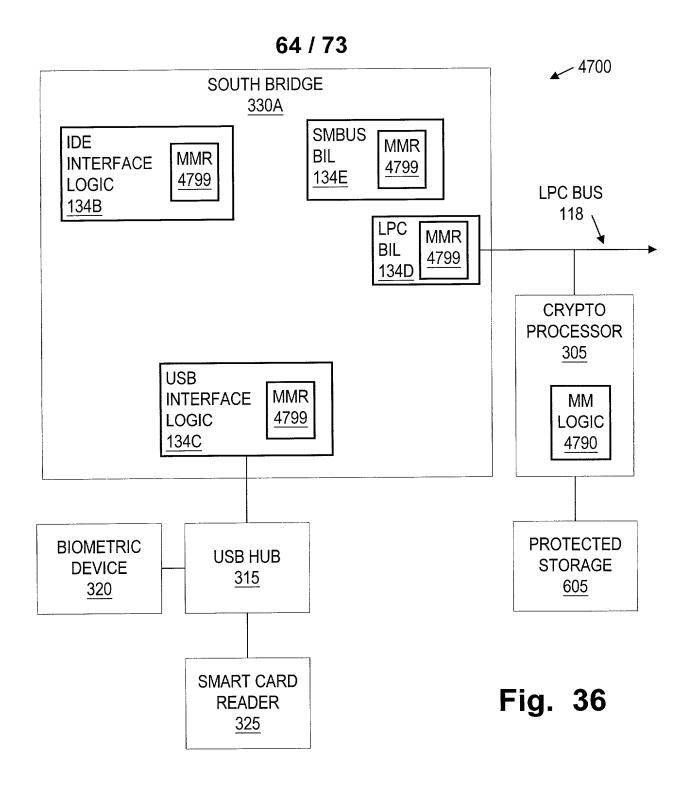
Fig. 34

4600

THE DEVICE RECEIVING A COMMAND FOR THE DEVICE TO LEAVE THE COMPUTER SYSTEM 4605

THE DEVICE RECEIVING A MAINTENANCE KEY THAT SUCCESSFULLY AUTHENTICATES 4610

THE DEVICE RESETS THE INTRODUCED BIT IN RESPONSE TO THE DEVICE RECEIVING THE MAINTENANCE KEY THAT SUCCESSFULLY AUTHENTICATES 4615



4800

TRANSMIT A MASTER MODE SIGNAL TO BUS INTERFACE LOGIC CONNECTED BETWEEN MASTER MODE LOGIC AND A DATA INPUT DEVICE, WHERE THE BUS INTERFACE LOGIC INCLUDES A MASTER MODE REGISTER 4805

SET A MASTER MODE BIT IN THE MASTER MODE REGISTER(S) TO ESTABLISH SECURE TRANSMISSION CHANNEL BETWEEN THE MASTER MODE LOGIC AND THE DATA INPUT DEVICE OUTSIDE THE OPERATING SYSTEM OF THE COMPUTER SYSTEM 4810

THE MASTER MODE LOGIC AND THE DATA INPUT DEVICE EXCHANGE DATA OUTSIDE THE OPERATING SYSTEM OF THE COMPUTER SYSTEM THROUGH THE BUS INTERFACE LOGIC(S) THAT INCLUDE THE MASTER MODE REGISTER 4815

THE MASTER MODE LOGIC FLUSHES THE BUFFERS OF THE BUS INTERFACE LOGIC(S) THAT INCLUDE THE MASTER MODE REGISTER AFTER CONCLUDING THE DATA TRANSMISSIONS 4820

THE MASTER MODE LOGIC SIGNALS THE BUS INTERFACE LOGIC(S) TO UNSET THE MASER MODE BITS AFTER FLUSHING THE BUFFERS OF THE BUS INTERFACE LOGIC(S) THAT INCLUDE THE MASTER MODE REGISTER $\frac{4825}{}$

Fig. 37



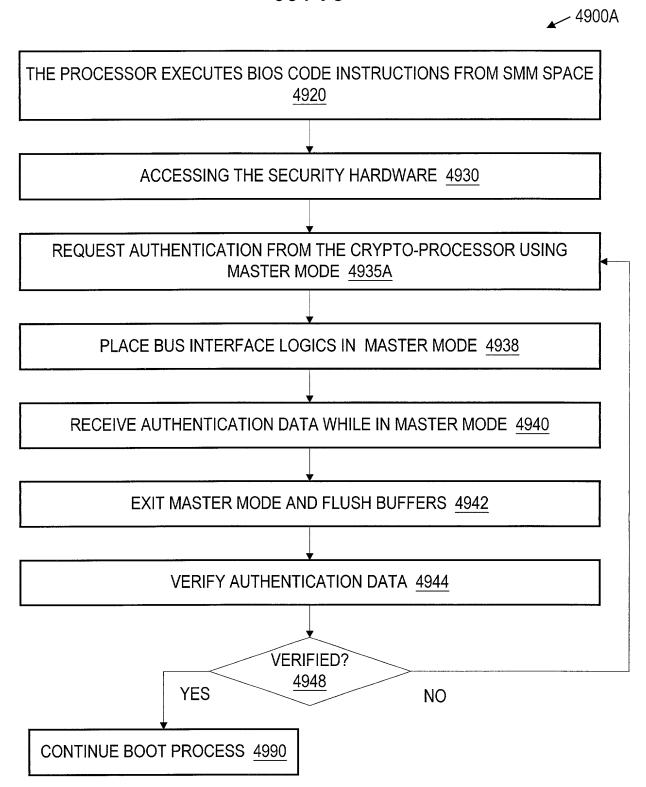


Fig. 38A

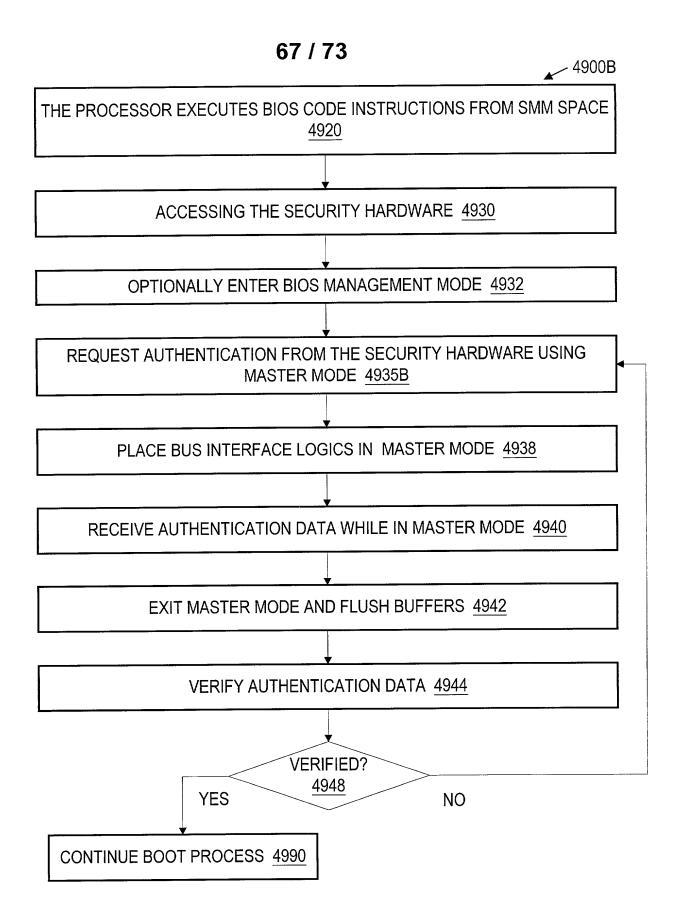


Fig. 38B

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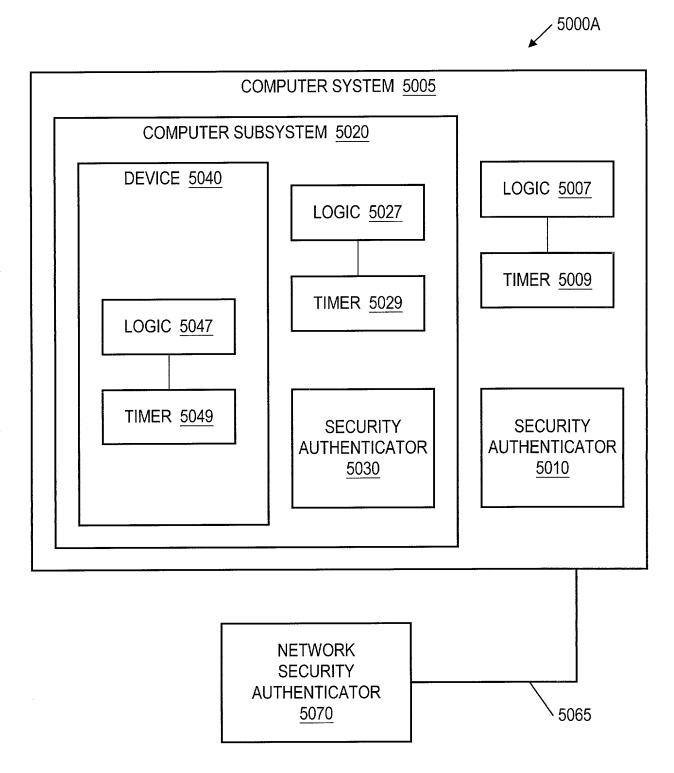
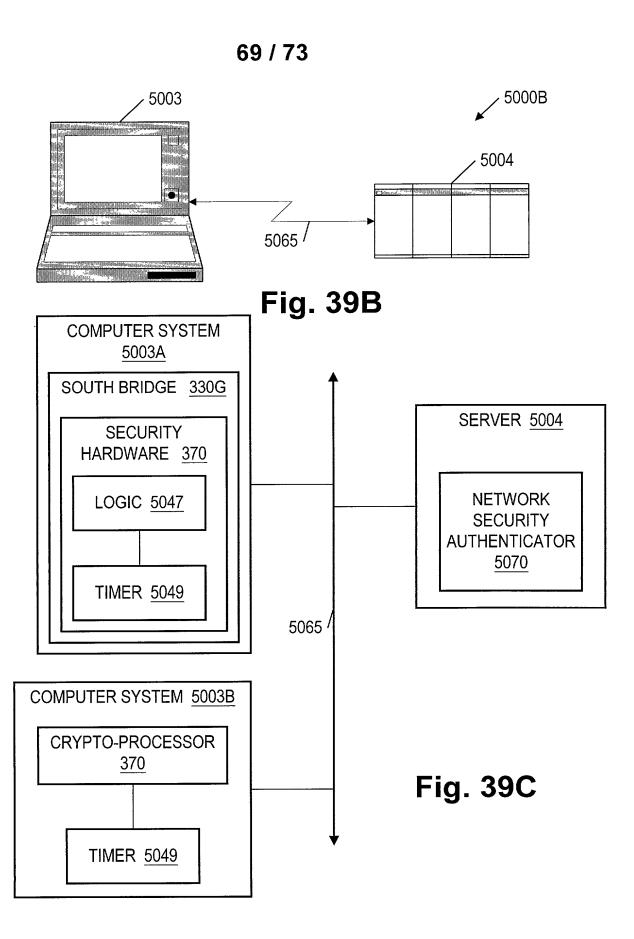


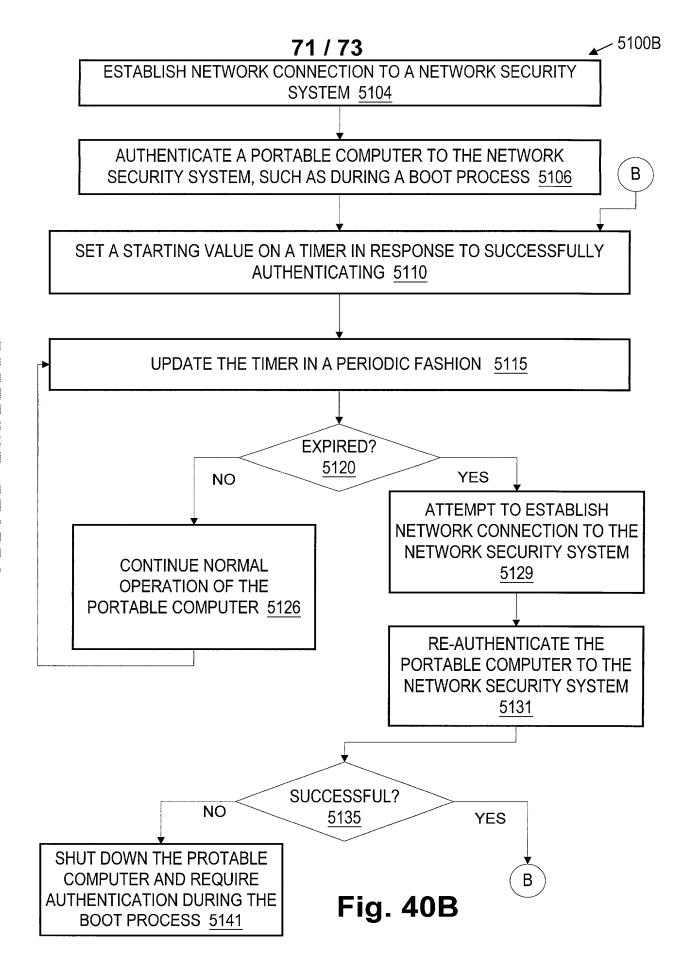
Fig. 39A



SHUT DOWN UNTIL RE-AUTHENTICATED 5140

70 / 73 5100A AUTHENTICATE A DEVICE, A COMPUTER SUBSYSTEM, OR A COMPUTER SYSTEM TO A COMPUTER SUBSYSTEM, A COMPUTER SYSTEM, OR A NETWORK SECURITY SYSTEM 5105 SET A STARTING VALUE ON A TIMER IN RESPONSE TO SUCCESSFULLY **AUTHENTICATING 5110** UPDATE THE TIMER IN A PERIODIC FASHION 5115 EXPIRED? 5120 NO YES CONTINUE NORMAL RE-AUTHENTICATE THE DEVICE. OPERATION OF THE DEVICE. THE COMPUTER SUBSYSTEM, THE COMPUTER SUBSYSTEM, OR THE COMPUTER SYSTEM TO OR THE COMPUTER SYSTEM THE COMPUTER SUBSYSTEM. 5125 THE COMPUTER SYSTEM, OR THE NETWORK SECURITY SYSTEM 5130 SUCCESSFUL? NO 5135 YES

Fig. 40A



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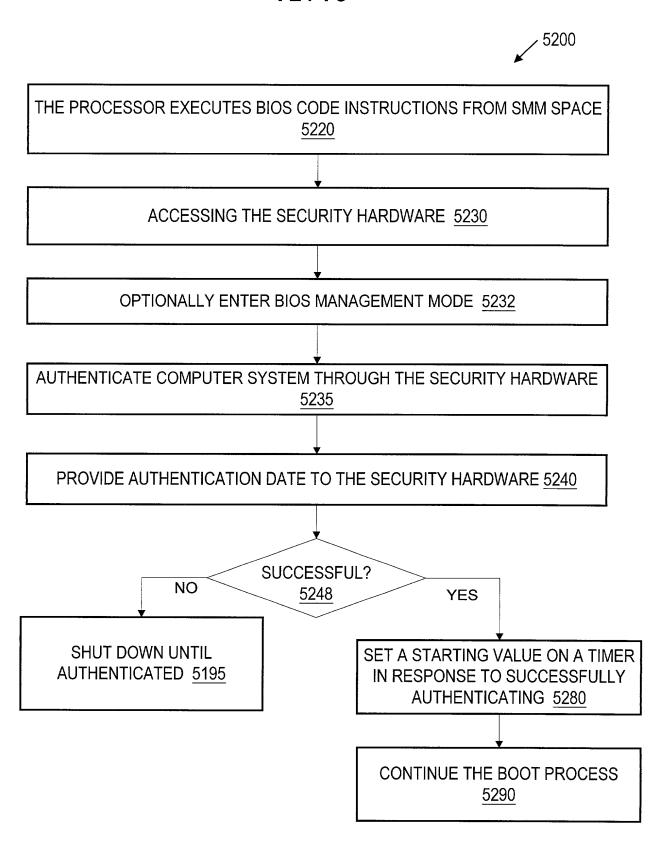


Fig. 41

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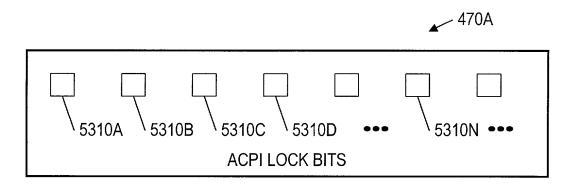


Fig. 42A

